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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/696,615 | 10/28/2003 | Se-Jin Ahn | 5649-1202 | 6846 |
| 20792 | 7590 | 11/15/2006 | | |
| MYERS BIGEL SIBLEY & SAJOVEC PO BOX 37428 RALEIGH, NC 27627 | | | EXAMINER CRANE, SARA W | |
| | | | ART UNIT 2811 | PAPER-NUMBER |

DATE MAILED: 11/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/696,615

Applicant(s)

AHN ET AL.

Examiner

Sara W. Crane

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12, 38-40, 45 and 46 is/are pending in the application.
- 4a) Of the above claim(s) 13-21, 33-37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 38-40, 45 and 46 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-12, 38-40, and 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakazato et al. in view of Hori.

With respect to claim 1, figure 16b of Nakazato et al. shows a planar transistor in the substrate (source and drain are 47 and 48) and a vertical side gate tunneling transistor disposed on the planar transistor. Hori figure 8 teaches to include a MISFET for selection adjacent a tunnel device disposed on a planar transistor. It would have been obvious to include a MOSFET as taught by the Hori figure in the Nakazato device, for the same purpose, i.e., to provide for selection circuitry as needed for a memory. With respect to claims 2-3, word lines would have been obvious in order to implement a memory array as desired, and to apply the needed signal to the gate of the (planar) memory transistor. With respect to claims 4-5, the storage node of the planar transistors is the gate, and the gate of Nakazato transistor is also the source for the vertical transistor current path shown at 3 in figure 16b. With respect to claims 6-7, the device of Hori figure 8 shows the features claimed. With respect to claim 8, lightly-doped-drain regions are well-known in the art, hence obvious, to control high electric fields near the drain. With respect to claim 9, the vertical transistor of Nakazato has a multi-junction storage pattern on the gate of the planar transistor, and a data line and a word line would have been obvious to provide the needed signals to the top of the

vertical transistor, and to the gate of the planar transistor. With respect to claim 10, the "second channel region" is understood to be the region under the gate of the memory transistor. With respect to claim 11, insulator between data and word lines would have been necessary to prevent shorting. With respect to claim 12, different thresholds would have been obvious in view of the difference in function and structure of the two devices. With respect to claims 45-46, the shared regions are as shown in the Hori figure.

With respect to claims 38-40, Hori figure 8 shows gates that are laterally offset from either source or drain, and the vertical transistor is as taught by Nakazato et al.

Applicant's remarks with respect to the pending claims have been considered, but are moot in view of the Nakazato et al. reference, which seems to correspond to the prior art figure of Yi et al.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Crane, whose telephone number is (571) 272-1652.

The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Sara W. Crane
Primary Examiner
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